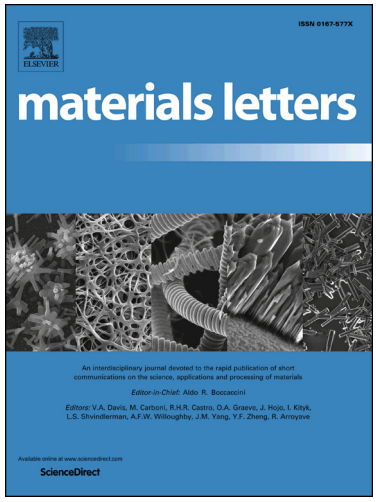

Metal Nanodroplets Catalyzed Growth of ZnS nanowires with a High Aspect Ratio via Long-pulse-width Laser Ablation in the Liquid Phase

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Metal Nanodroplets Catalyzed Growth of ZnS nanowires with a High Aspect Ratio via Long-pulse-width Laser Ablation in the Liquid Phase

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Abstract: ZnS nanowires with a high aspect ratio were successfully prepared by long-pulse-width millisecond laser ablation of Cu/Zn binary metal target immersed in dodecyl mercaptan (DDM) liquid under room conditions. The formation of ZnS nanowires was determined by the Cu nanodroplets formed upon laser ablation and laser parameters. The Cu nanodroplets formed upon laser ablation were proposed to act as catalyst to promote the growth of ZnS nanowires via vapor-liquid-solid mechanism in relatively stable micro-environment that close to the surface of the target.

Keywords: Semiconductor nanowires; Pulsed Laser ablation in liquid; Nanodroplets; Diffusion; Binary alloy; Dodecyl mercaptan;

1. Introduction

Direct-bandgap semiconductor nanostructures have been thought to be one of ideal candidates for optical and electrical applications [1-3]. ZnS and ZnO semiconductor nanostructures with different morphologies and special compositions have been successfully synthesized though high-temperature vapor process using chemical vapor deposition (CVD) [4], physical vapor deposition (PVD) [5] and laser ablation method [6]. Commonly these processes to produce ZnS nanomaterials involve rigorous

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